Having thus described the preferred embodiments, the invention is now claimed to be:

1. A thermal interface material which undergoes a phase change at microprocessor operating temperatures to transfer heat generated by a heat source to a heat sink, the material comprising:

a phase change substance which softens at about the operating temperature of the heat source, the phase change substance including:

a polymer component, and

a melting component mixed with the polymer component, which modifies the temperature at which the phase change substance softens; and

a thermally conductive filler dispersed within the phase change substance.

2. The thermal interface material of claim 1, wherein the phase change substance has a viscosity of from 1 to 100 poise at the operating temperature of the heat source.

3. The thermal interface material of claim 1, wherein the phase change substance has a viscosity of from 5 to 50 poise in the temperature range of 60 to 120°C.

4. The thermal interface material of claim 1, wherein the phase change substance has a melting point of 30-120 °C.

5. The thermal interface material of claim 1, wherein the polymer component includes an elastomer selected from the group consisting of silicone, acrylic polymers, natural rubber, synthetic rubber, and combinations thereof.

6. The thermal interface material of claim 1, wherein the polymer component has a Mooney viscosity of up to 40 ML4.

7. The thermal interface material of claim 1, wherein the melting point component is selected from the group consisting of C_{12}-C_{16} alcohols, acids, esters, petroleum waxes, wax-like compounds, low molecular weight styrenes, methyl triphenyl silane materials, and combinations thereof.

8. The thermal interface material of claim 7, wherein the melting point component is a C_{12}-C_{16} alcohol or acid selected from the group consisting of myristyl alcohol, cetyl alcohol, stearyl alcohol, myristyl acid, stearic acid, and combinations thereof.

9. The thermal interface material of claim 7, wherein the melting point component is a wax or a waxlike compound selected from the group consisting of microcrystalline wax, paraffin waxes, cyclopentane, heceicosyl, 2-heptadecanone, pentacosaneyl, silicic acid, tetraphenyl ester, octadecanoic acid, 2-[2-[2-(2hydroxyethoxy) ethoxy]ethoxy]ethyl ester, cyclohexane docosyl, polystyrene, polyamide resins, disiloxane 1,1,1, trimethyl-3,3, triphenyl silane, and combinations thereof.

10. The thermal interface material of claim 1, wherein the polymer component has a solubility parameter which is within +1 and -1 of the solubility parameter of the melting point component.

11. The thermal interface material of claim 1, wherein:

the polymer component is at a concentration of from 10-80% by weight;

the filler is at a concentration of from 10-80% by weight; and

the melting point component is at a concentration of from 10-80% by weight.

12. The thermal interface material of claim 11, wherein:

the polymer component is at a concentration of from 10-70% by weight;

the filler is at a concentration of from 10-70% by weight; and

the melting point component is at a concentration of from 15-70% by weight.

13. The thermal interface material of claim 1, wherein the thermally conductive filler has a bulk thermal conductivity of between about 0.5 and 1000 watts meter per degree Kelvin.

14. The thermal interface material of claim 1, wherein the thermal interface material has a thermal conductivity of at least 0.8 watts meter per degree Kelvin.

15. The thermal interface material of claim 1, wherein the thermally conductive filler is selected from the group consisting of boron nitride, aluminum oxide, nickel powder, copper flakes, graphite powder, powdered diamond, and combinations thereof.

16. The thermal interface material of claim 1, wherein the thermally conductive filler has an average particle size of from about 2 to 100 microns.

17. A multi-layer strip comprising:

a first layer of a thermal interface material for thermally connecting a heat source with a heat sink, including:

a polymer component,

a melting point component mixed with the polymer component in sufficient quantity to adjust the softening temperature of the interface material

to about the operating temperature of the heat source, and

a thermally conductive filler mixed with the melting point component and the polymer component; and

a second layer disposed on a side of the thermal interface material, the second layer including at least one of:

a protective releasable liner, and

a layer of an adhesive material.

18. The multi-layer strip of claim 17, wherein the second layer includes a protective releasable liner and the strip further comprises:

a layer of an adhesive material disposed on a second side of the thermal interface material.

19. The multi-layer strip of claim 18, further including:

a second protective release liner disposed on the layer adhesive material.

20. The multi-layer strip of claim 17, further including a reinforcing material in contact with the interface material.

21. The multi-layer strip of claim 20, wherein the reinforcing material is selected from the group consisting of fiberglass and aluminum foil.

22. The multi-layer strip of claim 17, wherein the protective liner includes a substrate coated with a release coating.

23. A method of providing a thermal interface between a

heat source and a heat sink, the method comprising:

interposing a thermal interface material between the heat source and heat sink which softens at about the operating temperature of the heat source to provide a thermal interface between the heat source and the heat sink during operation of the heat source, the thermal interface material including:

a polymer component,

a melting component for modifying the temperature at which the thermal interface material softens, and

a thermally conductive filler mixed with the polymer component and the melting point component.

24. The method of claim 23, further including:

adhering the thermal interface material to one of the heat source and the heat sink by application of heat.

25. The method of claim 23, further including:

adhering the thermal interface material to one of the heat source and the heat sink with a layer of an adhesive material.